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East Europe Report

SCIENTIFIC AFFAIRS

No. 685

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SCIENTIST CLAIMS THAT RESEARCH IN GENETICS IS FALLING BEHIND

Sofia LITERATUREN FRONT in Bulgarian 21 Aug 80 pp 1-2

[Interview with Academician Rumen Tsanev by Vera Stefanova: "The Optimist"]

[Text]

I do not recall what precisely impressed me the most when I found out that the son of the noted literary expert Academician Georgi Tsanev had become an academician himself. Perhaps it was the fact that Rumen, the youngster who grew up in those years of transition, who was always present in all the meetings of progressive writers in his father's home and who retained throughout his life not only vivid impressions but a love for literature, subsequently chose the field of the natural sciences. Today as well Academician Rumen Tsanev emotionally recalls as one of the most important events in his life the time when our noted geneticist Doncho Kostov, back from the Soviet Union, set up a new scientific unit under the BAN [Bulgarian Academy of Sciences] and took him as his assistant. I had not heard such an admission before meeting the younger Tsanev--the fact that if he could trade his academic title for very good working conditions he would do so immediately!

Naively, he may have considered another sincerely shared concern, not a concern for his own problems, for his road to the academic title, according to him, was clear and smooth. It was a concern for the future of science in whose area he has worked from its very beginning. He was concerned that we can no longer "pursue universal levels, and that this is a real tragedy to us, for our hands are tied. Abroad science is making great progress and the distance is growing steadily whereas we, because of lack of funds and the necessary equipment, are falling behind!

"However, I am naturally an optimist! I believe and I wait!" He was sincere, knowing that "in science there is no wide, gradual way...," and that one must climb steep paths...!

"Academician Tsanev, it seems to me that you are the only case in our country of father and son being academicians?"

"Yes. However, we are in different fields. Therefore, I have not inherited from my father...."

"Could you describe the results of your scientific activities and translate them into the language of the uneducated reader?"

"This would mean to describe to you my work. I am working in the field of molecular biology which studies chemical compounds and processes in living organisms which determine the phenomenon of life. It means that I am dealing with the nature of life, more particularly, the structure of the genetic apparatus, of the cellular structures which determine the hereditary characteristics of organisms. It is they that determine the behavior and characteristics of each organism. The determination of the molecular organization of such structures and their modus operandi is of particular importance in the struggle against some diseases, cancer in particular. The appearance of cancerous cells is due precisely to a disturbance of the structure of the cellular genetic apparatus. Therefore, this is a problem which is basic, which affects the essence of life, and is of exceptional importance to society. This is particularly the case today, when as a result of the development of molecular biology gene engineering has appeared."

"Please, could you give us a few more details on this new direction in your science. What are its possibilities?"

"Gene engineering makes it possible to isolate individual genes, to manipulate them, to transfer them from one organism to another, and to create an organism with a heredity which is a combination of different organisms. This is a very great success of molecular biology and the result not only of a single discovery but of a number of individual basic discoveries in the field of molecular biology. Gene engineering will make it possible to develop new industries and create new pharmaceuticals which would have been inconceivable in the past. Some human hormones have already been obtained this way. Quite recently gene engineering was able to synthesize a protein--interferon--which can protect man from catching a cold. It has been reported that it could be used in the treatment of some forms of cancer as well...."

"If all these are problems related to your area, does this mean that you are in the leading front of the science of biology?"

"Yes. Molecular biology is a strategic direction in biology, for discoveries in this science determine the solution of vitally important problems to mankind. On the one hand, in the field of medicine, this involves the struggle against viral diseases and malignant tumors, surmounting tissue incompatibilities in successful organ transplants, and so on. On the other hand, in agriculture, this means developing new species,

improving others, and creating new microorganisms which could clean the environment...."

"What about the strategic significance of your science?"

"Our discoveries may present a danger from the military viewpoint as well, for they offer the possibility for the creation of new microorganisms and strains which could be used for military purposes. My view is that this area is exceptionally, vitally important to any society and that it should be the subject of prime attention...."

"To the best of my knowledge, major arguments are underway on the interference of science in hereditary 'material.' Is this interference ethical?"

"In our science it is a question precisely of human interference in heredity and the creation of new organisms. Now, for example, new organisms have been developed containing human genetic material. I would not like to issue an opinion as to the ethical nature of such matters. I believe, however, that anything which serves man is ethical. In the final account, if everything benefits mankind the way covered by the scientists should not be taken into consideration as long as it has not harmed the people...!"

"What happenstances and errors did you experience before reaching your discovery number one?"

"I'm still hoping that I have not reached discovery number one, and that I am as yet to make it. In any work, naturally, even in the most insignificant, man does not come to the truth directly and immediately. The truth is not always reached smoothly. Occasionally, however, even an error could contribute to the development of science...."

"Nevertheless, is the distance from an error to a discovery long?"

"It may be long and it may be short. It depends on the case. We know from history that some scientists spent decades in work while others were lucky to achieve faster results. There is no rule. It is well known that discoveries may be accidental as well. However, they come to the trained mind only...."

"In one sentence, tell us about your best accomplishment."

"I think that it is related to some problems of molecular mechanisms controlling the development of organisms...."

"What other things have not as yet been entirely explained in your scientific area? What are your latest hypotheses?"

A number of things have not been explained. It is only now, in recent years, that molecular biology has brought to light the mechanisms of the hereditary

apparatus of the cell. The latest hypotheses of our collective apply to mechanisms through which gene activities are controlled. In this area very few things have been explained, particularly in the case of higher organisms."

"It has been repeatedly confirmed that the most important discoveries are being made through the synthesis of various fields of knowledge...."

"I agree. Molecular biology itself is, precisely, a combination of chemistry, physics, mathematics and biology. No one could work successfully in this area without a knowledge of the four subjects. This is the area in which these different sciences crisscross and, actually, this is what leads to the greatest discoveries...."

"Could you be more specific?"

"Take my successful work with Corresponding Member Professor Blagovest Sendov, for example. We made one of the first experiments in the mathematical modeling of cellular activities. This yielded interesting results for future experimental tests. We reached an important hypothesis on which we are working to this day. It is a question of the fact that the cell contains not only genetic information but other types of information which is not coded in the DNA and which determines the program for development of the organisms. According to some, the entire development information is found within the DNA. Our experiments, however, have led us to the idea that this is probably not the case. It is precisely on this epigenetic information that the experimental studies of our collective are focused. This is the usefulness of the crossing, the synthesizing of two sciences--biology and mathematics. In recent years this hypothesis has been adopted by a number of foreign scientists. Of late we have obtained experimental data in its favor...."

"It is known that science requires total dedication. How do you block the temptations of life?"

"I believe that science and scientific creativity are also a temptation, a rather strong one...!"

"Nevertheless, does this temptation exclude purely human temptations?"

"No, it does not. However, when it is very strong it imposes, in fact, a rhythm which takes over the individual from dawn to dusk, involving all efforts, so that the person does not have to protect himself...!"

"Some of your colleagues describe this as qualitative dedication."

"I do not agree, for in the final account, the person does this for his own satisfaction. Objectively, this is to the benefit of mankind so that, it turns out, the scientist dedicates himself to his respective science. Actually, he is satisfying his own, his scientific research interests...."

"You may have heard that the Soviet academician Kapitsa has won wittiness contests. To those unfamiliar with science this seems somewhat strange. That is why this is not an idle question: What is your attitude concerning humor? Do you like witty people?"

"Yes, I like humor. I like witty people very much. At the institute we greatly value those who have a feeling for humor. This you can see the moment you enter my office. Actually, have you read the text on the door: 'Take care of your boss, for the one who follows him may be worse!'"

"This text, it seems to me, was in English! It must be quite difficult for the candidates who enter your institute. Could it be that you are subjecting them to a competitive examination...in wittiness as well?"

"...Wit is something which, in my view, characterizes every serious person. A person who does not understand humor is not serious...."

"Yet, witty people are frequently sarcastic as well."

"Well, why not, if they have grounds to be biting...."

"How would you refute the claim that within each person there is another person?"

"I would not. In me too there lives yet another person or maybe two people. I have in me the person who loves literature and art, who engages in translations, and who frequently wastes time to practice his hobby. Since childhood I have dreamed of travel and adventures in strange countries. Naturally, this has been entirely suppressed. Furthermore, my wife says quite frequently that there is also a militiaman within me--that I always interfere with everything, and that I want to bring order to everything. So, here are several people living inside me...."

"You said that you love fiction and art. Do you feel the need for being always in touch with them?"

"Yes. Since childhood I have lived in such an environment and it is natural for me to love fiction, poetry in particular. I also confess to the 'sin' of translating, mainly Mayakovskiy. I translated one of his difficult poems before they were translated in our country. To this day I like to translate...."

"Under a pseudonym?"

"A pseudonym is a pseudonym precisely so that the author may remain unidentified. I translate for my own pleasure."

"What are the features of the contemporary, of this efficient 20th century, which you reject?"

"I cannot stand parasites. There are people in scientific institutes who, by virtue of their social position, use the work of others. I do have specific examples!"

"In your view, is this a phenomenon or an isolated case?"

"In my view, it is a phenomenon! I do not like arrogant or impudent people as well...!"

"Which of the major problems of today concern you the most?"

"The problem of peace above all! And of the possibility for the people to manifest their creativity, to live a free and creative life. This requires peace and a corresponding social environment. I am sure that this is problem number one for all people...!"

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STEPS TOWARD DEVELOPMENT OF ROBOTS DESCRIBED

Robot Developers

Sofia RABOTNICHESKO DELO in Bulgarian 1 Sep 80 p 4

[Article by Ivan Gerov, director of the Kazanluk Institute for Hydraulics and Pneumatics: "The Developers of Robots"]

[Text] In the struggle to increase production efficiency, ever-higher demands are being made on the development of hydraulics.

For more than a half century, hydraulic systems have proven their necessity and are required ever more certainly as a new, advanced technical system for accelerating the development of automation. Both at present and in the future these systems will have a decisive impact on the scientific and technical level of all modern machines and equipment and on entire production lines and automated plants.

In recent years, the Kazanluk Institute for Hydraulics and Pneumatics has been working in several basic areas related to the development of new and improved hydraulic systems and elements. The first of them encompasses the preparation of systems for industrial robots and manipulators, and this includes 20 group problems related mainly to the control and regulation of robots. The science associates and specialists at the institute are making an effort to improve the elements which increase the reliability of the production of battery-operated and internal combustion engine plant trucks, and this is another basic area in the institute's activities. The solving of the problems in this area includes the development of new types of cog pumps, pressure distributor valves and scores of other parts. As a third area in the institute's work we must also mention the increased range of hydraulic parts for exports to the Soviet Union. The wider use of hydraulic parts in mining equipment is also a basic area in which many results have been achieved.

At present it is impossible to carry out the intellectualization of production without the mass application and use of hydraulic elements and systems in every sort of machine and equipment. By combining the positive qualities of hydraulics with those of electrical engineering and electronics,

it is possible to realize optimum systems for movement, control, regulation and inspection.

The applicability of hydraulic and pneumatic systems and elements is growing annually. The average annual production rate for the industrially developed countries is 12-14 percent, and in certain countries as Japan, it has reached up to 25 percent. The ratio for the production of hydraulic systems to pneumatic ones is 3.5:1, and this shows the priority of hydraulics.

There are numerous examples of a multiple increase in the productivity of machines and equipment by the use of hydraulics in them. Thus an ordinary tractor with a mounted hydraulic system for beet thinning in 8 hours frees 52 persons. Here the hydraulic beet thinner is much lighter, some 30 percent in comparison with mechanical motion. Hydraulic metal cutting machines raised productivity from 30 to 50 percent, and for some even by 2-3-fold. Hydraulic excavators are 30 percent more productive and 12 percent lighter than those with purely mechanical propulsion. An automatic production line for pallets equipped with pneumatic robots requires 10-fold fewer man-hours than one with mechanical equipment, and so forth.

These and many other examples affirm that it would be impossible to carry out full mechanization and automation in most production processes without the accelerated development of hydraluics and pneumatics.

Development Trends

Sofia RABOTNICHESKO DELO in Bulgarian 1 Sep 80 p 4

[Article by Docent and Candidate of Technical Sciences Mikhail Komitovski of the Sofia V. I. Lenin Higher Mechanical Engineering Institute: "Development Trends"]

[Text] The requirements of scientific and technical progress as regards the automation of production processes and the increase in the productivity of machinery and equipment have brought about the exceptionally rapid development of hydraulic products. Indicative of this is the fact that in a number of developed countries of the world, the production of hydraulic drive elements and systems has been growing at a rate which outstrips the rate of other industrial sectors.

In our country the production volume of hydraulic elements has also been growing dynamically. Generally speaking, the hydraulic drive elements and systems at present have achieved a high technical level. They continue to be improved, and they compete with electric drive systems under the effect predominantly of diverse technical and economic factors such as the lower expenditure of labor and materials in producing them, improved speed and increased reliability. Another group of factors contributing to their development is closely tied to their use in new areas of industry such as robot production, heavy machine building, and so forth.

the high technical level of hydraulic drive systems to a great degree also determines the level of the end product, the machine or equipment. The development of production in areas in which our country has specialized within CEMA and has assumed leading positions such as the production of battery-operated and internal combustion engine plant trucks and manipulators, as well as the demands of developing heavy and investment machine building, have posed the task of setting up and organizing the production of new types of hydraulic elements and systems.

One of the trends which can be observed for many years now is the broad use of pumps with adjustable output and power as this provides a savings of energy.

The production of electrically controlled hydraulic elements is the following important development trend. With automatic or process-controlling devices of machines and equipment, the control signals, with few exceptions, are electronic or electric. In these instances, it is essential for the hydraulic elements to regulate the output, the direction of the flow, pressure and other variables in the system proportionately to the electric signal. This is achieved by employing servovalves, proportional distributors and output pressure valves.

The third trend in the development of hydraulic products is the creation of hydraulic systems with two-way valves for block assembly. Comparative analysis shows that with these systems there is a 2-fold reduction in the weight of the equipment, smaller losses of energy, with an increase in the service life, reliability and drive speed.

Without examining the remaining areas of hydraulic products, we would point out that the raising of the technical level of machine building is closely tied to the centralized production of complete hydraulic systems. This raises not only the quality of the products, but also creates an opportunity for rationally determining the production range and more rapidly introducing new and more efficient hydraulic systems into use. Their production can be viewed economically apart from building them into complete machines and equipment. In this sense, from the national economic viewpoint, it is not as important if it is essential and advisable to produce elements in small runs or with a lower production efficiency, and this runs contrary to the economic interests of the producer of these elements.

DEPUTY MINISTER DESCRIBES ATOMIC POWER STATION

Sofia ENERGETIKA in Bulgarian No 7, 1980 pp 9-15

[Article by Engineer Oved Tadzher, deputy minister of power supply: "The Kozloduy Nuclear Power Complex--Scales and Development Prospects"]

[Text] The commissioning of the first reactor of the Kozloduy Nuclear Power Plant marked the beginning of a new stage in the development of our power industry. Within record-setting time two blocks with a generating capacity of 440 megawatts each were installed. Today the nuclear power plant accounts for 20-22 percent of the country's electric power. In terms of this indicator--the share of nuclear power in the energy balance--today Bulgaria is in third place in the world.

By 1985 the Kozloduy AETs [Nuclear Power Plant] will have a generating capacity of 2,760 megawatts, which will be 28 percent of the maximum peak load of the energy system, and 32 percent of the country's electric power output. By 1987 these figures will rise, respectively, to 36 and 39 percent.

Such concentration of capacity, unheard of in terms of our scale, determines the comprehensive approach which must be applied in the development of the plant. The Kozloduy AETs must be fully supplied with everything necessary for normal operations--highly skilled cadres, repair capabilities, buffer warehouses of various kinds, construction and installation capacities, living amenities, and others.

The program for the development of the national energy complex stipulates that by 1990 atomic power in the power industry must reach 5,760 megawatts. The third and fourth blocks of the Kozloduy AETs will be commissioned in 1980-1981, thus raising its overall capacity to 1,760 megawatts.

The subsequent blocks will involve new generation reactors developing a capacity of 1,000 megawatts each.

Detailed studies were made by the Energoproekt NIPPIES [Scientific Research Planning and Design Institute for Power Systems] and the

Ministry of Power Supply on the location of the new VVER-1,000 reactors both on the site of the Kozloduy AETs and on other sites. Consultations with Soviet organisations were held as well.

The possibility to concentrate a capacity of 3,760 megawatts on a single site was considered in detail. The results of the studies and comparative data for other countries have confirmed the expediency of building two blocks with an overall capacity of 2,000 megawatts on the site of the Kozloduy AETs.

In the USSR, for example, sites for a 4,000 megawatt capacity are being selected, with a possibility to raise it to 6,000 megawatts. They include the Smolensk, Chernobyl', Khmel'nik, and other sites. Nuclear power plants on sites with capacities similar to ours have been built in Japan, the United States, the GDR, France, the FRG, Canada, and elsewhere.

Insuring the normal operation of the four blocks of the VVER-440 blocks and the two new blocks generating 1,000 megawatts each called for the adoption of a number of new qualitatively different designs. This is also related to the closeness of the suggested site for a second nuclear power plant and the convenient transport route of the Danube River.

The development of the Kozloduy Nuclear Power Complex was based on an order of the Council of Ministers. The complex will be a powerful base for our power industry whose role and significance are determined by the basic strategic direction followed by the party's energy policy of accelerated development of an atomic power industry.

The nuclear power complex (AEK) developed gradually and systematically, in accordance with requirements governing operations and construction, and cadres and their training.

It could be said today that its scale has been defined. It will have an overall generating capacity for 3,760 megawatts (4 x 440 + 2 x 1,000), covering installations for the transportation of the spent fuel, processing shops and warehouses for the storage of a variety of radioactive waste, repair capacities, and a powerful construction and installation base (Fig. 2). Delivering and training conditions of cadres within the complex will be based on the latest requirements.

The development of the complex covers the following stages:

Kozloduy AETs-first stage-2 x 440 megawatts

The project was completed in 1973 with the commissioning of the second 440 megawatt reactor. In the subsequent five-years the plant operated

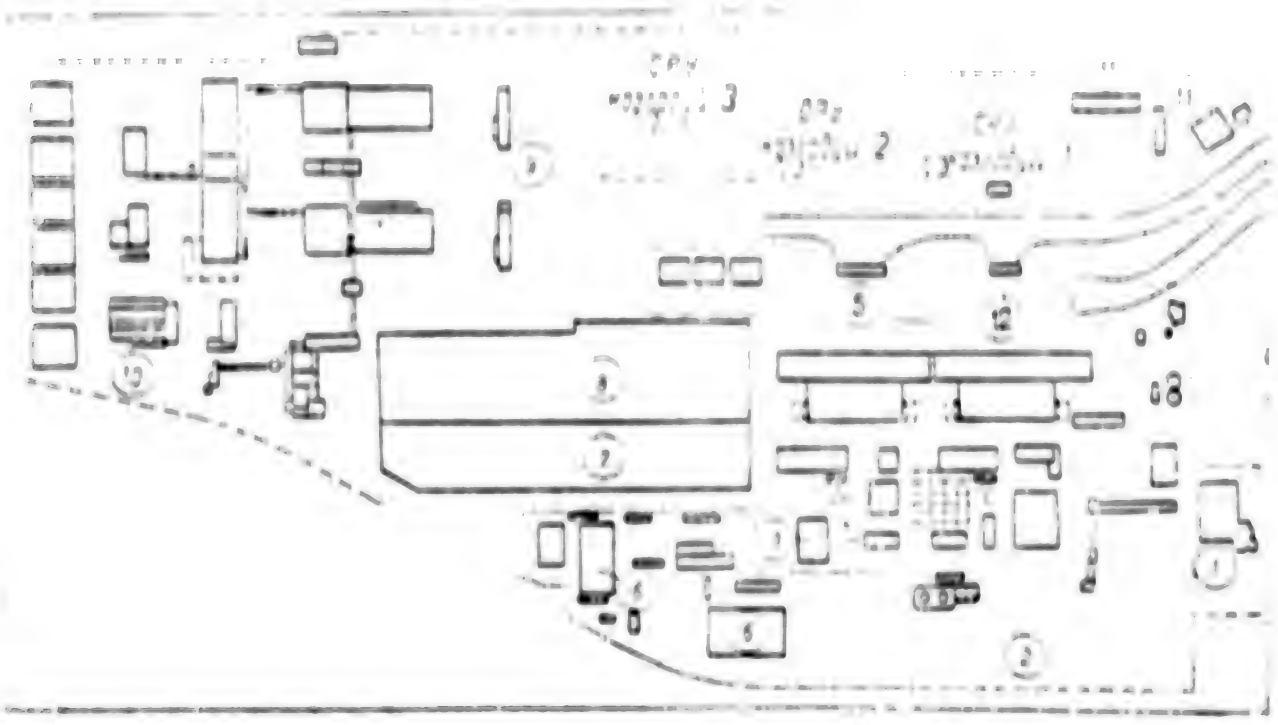


Fig. 1. Diagram of the Kozloduy Nuclear Power Complex

Key:
1. Training center
2. Nuclear electric power plant 1
3. Spent fuel storage
4. Workshop for the repair of installations in the first section
5. Nuclear power plant 2
6. Repair base (first stage)
6' Repair base (second stage)
7. Construction base
8. Installation base
9. Nuclear power plant 3 (2 x 1,000 megawatts)
10. Base of the Tekhenergo NPP [Scientific Production Enterprise]
11. Warehouse for soft polluted waste
12. Shore pumping station
13. Kozloduy ORU

in a stable and reliable manner. All planned indicators were outstripped in 1979 and over 6.1 billion kilowatt hours of electric power were generated.

Kozloduy AETs--second stage--2 x 440 megawatts

The two new blocks of the Kozloduy AETs, to be commissioned in 1980 and 1981, have an advanced design with additional systems which offer better support to the plant's work under different systems. Thus, for example, a more reliable solution has been provided to the systems for emergency injection of a boric acid solution, a sprinkler system, the feeding of

steam generators, and others. Industrial water supplies have been considerably improved. Three separate systems have been planned for the major consumers of each block. A better technical solution has been found for the shore and circulation pumping station. The two shore pumping stations are connected, which insures their operational maneuverability. The possibility of the flooding of shore pumping stations has been avoided, and so on.

More advanced solutions have been applied also in the electric power supply systems which will become more autonomous. Particular attention has been paid to the reliability of the system for emergency electric power supplies to first category consumers. The possibility of emergency stopping of the block and reducing its capacity with an emergency control panel has been stipulated.

Before the new blocks have been commissioned the bulk of the measures for raising the seismic resistance of the blocks will be carried out. They are contained in a special project designed by Soviet specialists and call for upgrading the seismic resistance of equipment and buildings for an earthquake rated as 7 on the Richter scale and a recurrence possibility of once every 10,000 years. The basic systems of the first section will be reinforced: the reactor building, the steam generators, the main circulation pumps, the actuating mechanisms, and others.

To this purpose special hydraulic shocks are being procured from Japan. The main steam pipes and other systems of the second part of the plant will be reinforced. A special system will be installed for industrial antiseismic protection which will switch off the generators should an earthquake reach a certain level. The existing battery system will be replaced by a seismically resistant one.

Later on, the main circulation pumps will be replaced by new inertial-type pums (with a flywheel).

All measures aimed at strengthening antiseismic protection will be also implemented later on at the operating blocks of the first stage of the Kozloduy AETs.

The Kozloduy AETs--third stage--2 x 1,000 megawatts

The third stage of the Kozloduy AETs will also have water-water type reactors developing an electric power generating capacity of 1,000 megawatts and saturated steam turbines with a unit power of 1000 MW, 3000 min^{-1}. The basic equipment will be procured from the USSR. Other parts will be delivered by the remaining CEMA-member countries as well, on the basis of an intergovernmental agreement. The plan for the Kozloduy 3 AETs is being drafted in a way which will make it possible to build and commission initially one block, followed by the second.

Industrial water supplies for the first 1,000 megawatt block will be provided through existing hydroengineering systems; the second block will require the building of a new water supply system from the Danube River. The two water supply systems will be connected. This will make the water supply system more flexible and more reliable.

The new reactors of the VVER-1,000 type (Fig. 2) represent a higher level in the development and perfecting of this type reactors. We know that water-water reactors are exceptionally reliable and stable and that their coefficient of use between recharging exceeds, in many of them, 0.90-0.95.

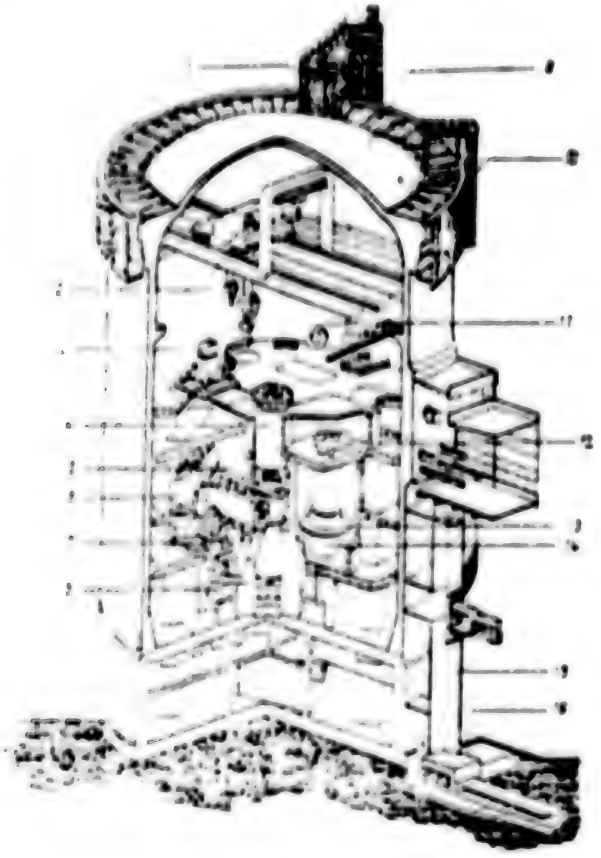


Fig. 2. Block with a 1,000 megawatt nuclear reactor

Key:
1. Roof exit
2. Bridge crane
3. Reloading machine
4. V-1,000 reactor
5. Steam mains
6. Steam generators
7. Main circulation pump
8. Main stopping valve
9. Reactor reinforced concrete cover
10. Upper manipulator
11. Emergency exit
12. Emulsifier
13. Service area
14. Volume compensator
15. Cable shaft
16. Pipeline passageway

The nuclear steam generating system will be located under a protective cover (dome) which will insure the radiation safety of the plant localizing their radioactive environment in the case of a breakdown cracking of the first section, accompanied by an increase in the internal pressure to 0.5 MPa and a temperature of up to 150°C. The dome will also serve as a protection from outside shocks such as a shockwave or a falling object.

The cover will consist of prestressed reinforced concrete with an internal steel lining based on a technology especially developed for the purpose by Soviet specialists. Under our circumstances this will require the organization of a new construction and installation base equipped with the necessary ships and machinery and proper crane mechanisms.

The designing of the construction and installation base was preceded by a detailed study of Soviet experience and consultations with respective Soviet organizations.

The annual gross electric power production will be about 7.5 billion kilowatt hours per block operating on a basic system of 7,000 effective hours. The reactor fuel will be uranium dioxide. Two variants--3.5 percent or 4.4 percent--had been planned, depending on the interval between recharging.

Spent Fuel Storage

In accordance with the recommendations of Soviet specialists, and on the basis of the territorial and geographic conditions of the Kozloduy AETs, the decision was made to build a storage for exhausted fuel on the plan's territory. Its purpose will be to receive, store, and ship out the cases with spent fuel. The design stipulates that all operations shall be in full accordance with technological requirements and radiation safety norms. The plant will have a special trailer truck for the transportation of the spent fuel. With the help of lifting equipment, the spent fuel will be taken from the truck to its allocated storage area. In the converse operation--the removal of the container--it shall be washed with special solutions and systems so that it may be deactivated to the level of the stipulated health norms.

The storage area will consist of individual and separate water-filled basins. The containers will be located at the bottom in other special containers. The storage area will have all the necessary systems for safety storing conditions.

Their capacity will be sufficient to take the containers from the four blocks of 440 megawatts each for a 10-year period. The problem of storing in the same area the containers from the 1,000 megawatt blocks is under study.

The design calls for the maximum utilization of existing installations and buildings for the preparation of deactivation solutions, water treatment, storing of radioactive waste, water supplies, steam supplies, sanitary living conditions, and others. The size of the personnel has been reduced to a minimum.

With the completion of the storage area for the spent fuel the power plant will become far better equipped and flexible in resolving problems related to spent fuel in various situations.

Installations for the Transportation of Spent Fuel

The shipping out of the spent fuel is a basic problem facing the power plant. In accordance with the intergovernmental agreement concluded between Bulgaria and the USSR, the spent fuel will be shipped to the USSR and processed in Soviet plants.

The transportation of the spent fuel is one of the most complex and difficult problems to resolve in the operation of nuclear power plants. That is why particular attention was paid to it. The plan for the transportation of spent fuel was developed by the Energoproekt NIPPIES with the active technical assistance of Soviet specialists. The necessary transport facilities for hauling the spent fuel have been secured and the hauling technology is fully in accordance with the stipulations of the International Atomic Energy Agency. Some of the fuel transportation cycles have already been successfully implemented. This is a major Bulgarian achievement.

The Tekhenergo NPP Base

The development and improvement of power production and distribution calls for converting from the automation of individual production sectors to the creation of a unified interrelated automated system for the control of production processes.

Its implementation involves the saturation of technological processes with technical automated facilities and the utilization, along with mass-produced instruments, of a broad variety of specialized and one-of-a-kind apparatus based on the characteristics of the specific processes and installations. The various such apparatus have been produced either in small series or on a custom-made basis.

Studies have indicated that the need for spetialized equipment in the sector is rising steadily and that by the end of the Eighth Five-Year Plan it will exceed 12 million leva per year. On the other hand, the ever stricter requirements for full metrological support of the production process call for the adoption of a new approach to the solution of the problem of automated technical facilities through centralized repair operations under industrial conditions.

So far, the Tekhenergo NPP has mastered the production of a certain variety of technical facilities with an annual output in excess of one million leva, including some 50 different types of items. The number of such items is being steadily expanded and developed in order to cover also installations which are currently being imported. In order to make such activities consistent with the increased requirements, in 1979 a branch of the Tekhenergo NPP was opened on the territory of the Kozloduy AETs. Its production program includes the making of specialized equipment for the needs of the sector and for spare parts, as well as centralized repair of technical means for the control and management of technological processes.

The subsequent development of this branch as a sectorial plant with an annual output scheduled to exceed five million leva by 1985, employing about 400 people, will make it possible to successfully resolve several other problems such as:

Sets of apparatus for the control and automation of newly built, reconstructed, or modernized projects in the power system through cooperation and integration with CEMA-member countries and with domestic plants;

Acceleration of the pace of automation of the energy system through electronics, robotics, and the application of other achievements of technical progress;

Fuller employment of women in the area of the Kozloduy Nuclear Power Complex.

At the end of this development the plant will encompass all engineering activities related to automation in the power industry.

Base for Equipment Repairs at the Kozloduy AETs

The high concentration of capacities at the Kozloduy AETs calls for the creation of a corresponding repair base. The 440 megawatt blocks will have two 220 megawatt turbines each. Every year each block will be recharged with fuel. The recharging takes 35 to 40 days. Meanwhile, the remaining power systems in unserviced premises and in the general part of the block will be repaired. Every year capital repairs will be made on one of the turbines and limited repairs to the second.

The capital repairs of the turbine will take 65 to 70 days. Therefore, the time for the reloading and repair of the four blocks will be 150 days, while that of basic repairs of the turbines will be about 260 to 280 days. Subsequently the time of repair operations of the 1,000 megawatt blocks will be stated.

A large number of various installations will be concentrated in the Kozloduy AEK: turbines, pumps, transformers, generators, electrical equipment, a large number of control-measuring apparatus, and others. The cost of such installation will be about one billion leva. This will require the annual production of spare parts worth 30 million leva. This is the base of the development of repair capacities on the site of the Kozloduy AEK.

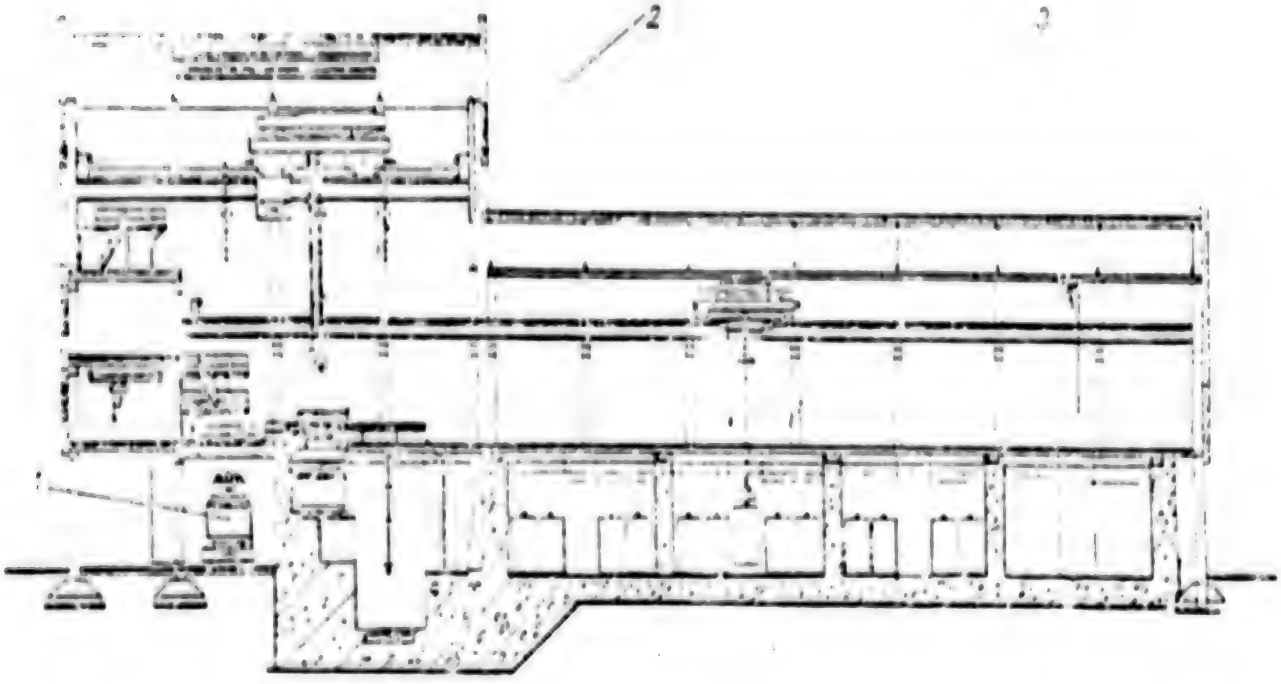


Fig. 3. Spent Fuel Storage

Key: 1. Spent fuel container
2. Valve and lever with special clamp
3. Special shielding container for the containers with spent fuel (slipper).

Fig. 1 shows the Kozloduy AEK repair shops. Several basic considerations governed the positioning of repair capacities, such as:

insuring the most effective utilization of the manpower. This means, for example, the use of the entire repair personnel in periods of major labor-intensive repairs at the plant and the transfer of some personnel to the repair base in slack periods;

The possibility and expediency of using a number of common installations and engineering facilities such as roads, water and sewer mains, steam pipes, communications systems, production cooperation facilities, and others, thus saving considerable capital investments;

Better possibilities for the organizational coordination of repair operations;

Utilization of some buildings and installations of the construction base which will become unnecessary after the future expansion of the Kozloduy AEK.

The designing and construction of a base for the production of spare parts, attachments, and equipment for the Kozloduy AETs was undertaken by Decision No 631 of the Council of Ministers, dated 29 October 1974.

The first stage of the Kozloduy BREO [Spare Parts Production Base] was commissioned in May 1978. The production program of the base amounts to 5.2 million leva per year.

The base can repair high tension electric motors, machinery operating with direct current, and explosion-proof low tension electric motors.

Laboratories for metal control and weldings, OTKK [Technical Control Department], and units for the drafting of design and technological documents and production preparations have been set up.

In 1979 the Kozloduy BREO produced goods worth about three million leva. The base also developed a one-of-a-kind container for checking the body of the VVER-440 reactor of the AETs, thus saving substantial funds. Important equipment was produced for the thermoelectric plants within the system, such as drum-scraper metering devices, work wheels for grinding fans, bodies of air and smoke fans, pressure containers and reservoirs, and others.

The completion of the second stage of the base will create conditions for expanding the production of auxiliary equipment for the AETs.

Between 1980 and 1982 the Kozloduy BREO will be expanded (second stage) with the addition of three industrial premises. The production program will be expanded by including the production of spare parts, repair appliances, and some type of atomic systems.

A modern hammer-press section will be built. The Energoremont SO [Economic Trust] will organize a cooperated system with the castings plant in Kresna for the manufacturing of special castings of steel, cast iron, and nonferrous metals.

The completion of the second stage will provide the solution to a problem of essential significance in the building of power projects: anti-corrosion lining and rubberizing of containers and pipelines.

Workshop for the Repair of First Section Installations

In addition to general purpose repair capabilities, the nature of the production process in the nuclear power plant calls for the development of capabilities for the repair of installations which have operated in the strict regimen area. The main buildings of the power plant contain some deactivation systems whose possibilities are rather limited.

Repairs of first stage installations are related to a number of characteristics and requirements affecting both the equipment and the personnel. The equipment calls for special installations for transportation to the repair shop where, along with cleaning and lubrication operations, it must be deactivated with special solutions on the basis of a specific technological discipline for the separation and storage of waste--liquid (solutions, oils, and so on), soft (threads, clothing, and others), and solid (shavings, instruments, and others).

The personnel in this workshop must obey the general requirements for personnel working in an environment containing radioactive pollution. A number of other requirements must be observed in terms of the ventilation system, purification of the air, waste water treatment, and so on.

The workshop for the repair of first stage installations, currently being designed, will insure their repair along with the capital repair of a power block and the running repair of the second. Meanwhile, the remaining blocks will operate normally.

The workshop will have facilities for disassembling main circulation pumps, their electric motors, conduits for SUZ [Control and Shielding Systems], main blocking valves and other armatures, heat exchange systems, pumps, low tension electric motors, fans, and others.

The workshop will have a section for pressing and briquetting of shavings, laboratories, drying premises for engines, an instruments workshop, and others.

The size of capital investments has been substantially reduced through the utilization of many joint buildings, equipments, and systems.

The workshop will be equipped with a special system for dosimetric control and biological protection facilities will be provided in the respective premises.

Training Center

The specific nature of the nuclear power industry requires the steady upgrading of the skills of the operational personnel, the improvement of their knowledge and skills, and maintaining it in a state of readiness. This cannot be achieved exclusively through theoretical studies but calls for systematic personnel training under complex emergency conditions. This applies both to the training of existing cadres as well as the personnel of the new blocks scheduled for commissioning.

To this effect the Kozloduy AETs is building a training center equipped with laboratories for various subjects, classrooms, a projections hall with about 700 seats, and others. Subsequently, a simulator for the 440 megawatt and 1,000 megawatt blocks will be added to the training center. The training center will be used also by the nuclear power industry technical school located in Kozloduy and for holding international meetings, symposiums, conferences, and so on.

Construction-Installation Base

In the building of the first and second stages of the Kozloduy AETs, the output requirements for construction and installation were fully met by the developed facilities at the site without requiring, even in the most stressed construction periods, the delivery of structures or installations by other producers.

However, the requirements of the 1,000 megawatt blocks would require a radical reconstruction of the base part of which will be used to meet operational requirements as well.

In accordance with the Council of Ministers decision a new modern construction and installation base will be built to provide all the necessary prerequisites for the building of the new capacities within the stipulated short times with considerably stricter requirements. Because of the convenient transportation connections with the site of the second nuclear power plant, this base will be used for the production of construction and installation items and to meet the requirements of the second power plant as well.

Warehouse for Soft Polluted Waste

Some quantities of soft radioactive polluted waste develops in the course of the operation of the plant: clothing, threads, rags, and so on. Their processing and storage creates certain difficulties. This was the reason for the building of a warehouse for such purposes. It consists of reinforced concrete cells whose insulation will be achieved in two stages: the first before packing them and the second which will involve their sealing. The dimensions of the storage area will make it possible to retain properly pressed waste for a period of 10 to 15 years.

Shop for the Processing and Storing of Radioactive Waste

The problem of processing and storing liquid radioactive waste which contain components with a long half-life is one of the most complex in the operation of nuclear power plants. Our specialists from the Institute of nuclear research and nuclear power industry, Energoproekt NIPPIES, and Kozloduy AETs have joined efforts to resolve the problem through the development of various alternatives for the processing of radioactive waste. Global experience in this area is being energetically studied as well. At the same time, Soviet organizations are being consulted for purposes of designing and building such a shop with their cooperation, based on the bitumen lining. It is believed that its construction could be undertaken at the beginning of the next five-year plan.

It is worth mentioning that the building of the Kozloduy nuclear power complex is being paralleled by the extensive urbanization of Kozloduy. A program has been drafted for the next 5 years stipulating the building of a number of new sports, health, training, and commercial installations, heat supply facilities, and others. This will help to improve the living and recreation conditions of the workers and specialists of the biggest energy complex in the country.

5003
CSO: 2200

BULGARIAN SUBSYSTEM RECEIVES INTERNATIONAL APPROBATION

Budapest SZAMITASTECHNIKA in Hungarian Jul-Aug 80 p 5

[Article by Imre Szentivanyi: "International Approbation of the 100/200-Megabyte Bulgarian Subsystem"]

[Text] The new, series-produced ESZ-5567 100/200-Mbyte disk control unit, ESZ-5067 control module, ESZ-5067.02 2x100-Mbyte disk drive unit (IZOT 5066E), ESZ-5067 1x200-Mbyte disk drive unit, and their 100-Mbyte (ESZ-5266.01) and 200-Mbyte (ESZ-5267) disk packs were tested successfully also before an international committee, in Sofia.

The Bulgarian-made ESZ 1035 B computer, and the OS/ESZ 6.1 operating system were used in the approbation tests.

The control unit can be connected to (one or two) block-multiplexor or selector channels of an ESZR Series 2 computer. To the control unit one can connect at most four control modules, each with a maximum of eight axes, with a capacity of 100/200 Mbytes per axis (for example, eight ESZ-5067 or four ESZ-5067.02 drives).

In this way the control unit is able to service 6400 Mbytes. The control unit is equipped with sophisticated microdiagnostics, and it is able to locate and explain errors without interrupting the operating system. The necessary microprograms are stored on a floppy disk (ESZ-5074). The subsystem is built with MSI TTL integrated circuits. Special-purpose equipment has been developed to make repairs and maintenance more efficient (for example, the IZOT A547E TIDU, the IZOT A548 head tester, etc.). The subsystem successfully passed the bilateral GDR-Bulgarian tests using an ESZ-1055 computer and the OS/ESZ 6.1 operating system in the SVS mode (ESZ-5567-5667-5067.02 subsystem); and it also passed the Czechoslovak-Bulgarian tests using an ESZ-1025 computer and a DOS/ESZ 3.0 operating system and an integrated interface (ESZ-5667-5067.02 subsystem). The delegations were able to acquaint themselves in detail with the susbsystem's production process.

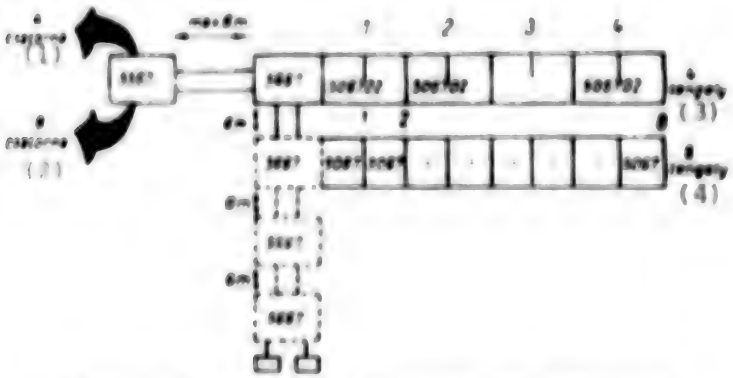
The 100-Mbyte subsystem will be supplied to Hungary already this year, as a part of the Bulgarian-made ESZ-1035/B computer.

The Bulgarian equipment is able to replace the following IBM or MEMOREX models:

A bolgár berendezések a következő IBM, illetve MEMOREX típusokat helyettesíthetik:

(1) Megnevezés	Vezérlő (2)	IBM	MEMOREX	BASF
100/200 MB vezérlő (2)	[illegible]	[illegible]	[illegible]	[illegible]
100/200 MB vezérlő (3) modul	[illegible]	[illegible]	[illegible]	
8×100 MB meghajtó (4)	[illegible]	[illegible]	[illegible]	[illegible]
8×200 MB meghajtó	[illegible]	[illegible]	[illegible]	
1×200 MB meghajtó	[illegible]			
LEMEZ CSOMAG (5)				
100 MB	[illegible]	[illegible]	MARK X	[illegible]
200 MB	[illegible]	[illegible]	MARK XI	

Key: 1. Designation
2. Control unit
3. Control module
4. Drive
5. Disk packs



A meghajtó egységek egy lehetséges konfigurációhoz

Drive units in a feasible configuration.

Key: 1. Channel A
2. Channel B
3. Four axes
4. Eight axes

1014
CSO: 2502

NEW METAL PROCESSING TECHNOLOGIES DEVELOPED

Sofia VECHERNI NOVINI in Bulgarian 13 Sep 80 p 4

[Article by Senior Science Associate and Doctor of Technical Sciences Yanko Arsov, deputy director of the Institute of Physical Metallurgy and Metal Technology of the Bulgarian Academy of Sciences: "Intellectualization the Main Trend of Bulgarian Science: Direct Application of Original Methods of Metalworking under Gas Counterpressure Leads to High Economic Results; Institute of Physical Metallurgy and Metal Technology of the Bulgarian Academy of Sciences Increasingly Links Its Programs with Production Practice"]

[Text] The Eighth Five-Year Plan, a five-year plan of technical progress, reveals its inner gist through its intellectualization of the entire cycle of the production process, from scientific research and development to practical exploitation and sales. One of the main decisive factors in raising the social productivity of labor is the development of individual scientific lines of inquiry and the accelerated exploitation of achievements.

Comrade Todor Zhivkov has set as a fundamental task of the scientific institutes to face the most important and timely production problems and to be in the forefront in creating new materials, technologies and new high-quality products so as to improve decisively the efficiency of scientific work.

In fulfillment of this highly important task the scientific research activity of the Institute of Physical Metallurgy and Metal Technology of the Bulgarian Academy of Sciences has been directed towards further development of problems involving application of the methods of material processing under gas counterpressure developed by Academician A. Balevski and Corresponding Member Prof. Iv. Dimov.

The promise of these methods and their ever-increasing importance for the practical world have made it possible, through purposeful utilization of the institute's key scientific personnel potential, to carry on research and development activity in significant volume and at a high scientific level and solve a number of problems of importance for the national economy.

Our institute conducts fundamental research on the creation of qualitatively new alloys, on the formulation of the technological principles for their production and further processing, and on the creation of laboratory prototypes of machinery for processing materials under gas counterpressure, as well as other special-purpose equipment.

The year 1980 saw the final conclusion of studies in the scientific and technical program, "Expanded Research on, and Practical Exploitation of, Low-Alloy Nitrogen Structural Steels." In the course of the program's execution there were created, and practical exploitation initiated of, new makes of structural low-alloy nitrogen steels possessing high quality indices that guaranteed their wide application in various sectors of the national economy.

Our railway car-building has been almost entirely reorganized on the basis of nitrogen structural steels. Their high quality indices have made possible up to a 30-percent weight reduction of the cars; export opportunities have been created, with exports so far of 3500 cars having a total value of about 85 million foreign-exchange leva.

The country's problems in producing containers for the storage of petroleum products are being solved. Huge tanks with a capacity of 50,000 cubic meters are being built of these steels.

Gas pipe has been produced and the need thereof for the USSR-Bulgaria pipeline met, wherewith pipe imports from Japan and Italy have been halted and a significant economic effect realized from foreign exchange in a second direction.

The steels have found application also in a number of other products and structural members. With them, our country's obligations involved in the building of the Ust'-Ilimsk and Kimbayevskiy combine in the USSR etc. were performed.

Shaped castings of various aluminum alloys are in regular production. Capacity is being created for the production of large-sized parts, ingots, rims etc., cast by countergravity casting methods. The new technologies guarantee high physicomechanical indices of products, savings of metal are realized, and imports of the expensive equipment used in the present conventional technologies are avoided.

Original methods and equipment have been created for the molding of foaming thermoplastic melts and the production of articles therefrom. This has enabled our country to occupy a leading place in CEMA as the sole producer of specialized machinery for countergravity molding.

In fulfillment of the goals from the BCP Central Committee of putting production on scientific foundations, the Institute of Physical Metallurgy and Metal Technology during the Seventh Five-Year Plan entered into a number of contracts for the study of unplanned assignments whereby problems of Ferrous Metallurgy, Metal Chemistry, and Hydraulics State Economic Trusts and of Cables and Conductors Economic Combine etc. were solved. Technologies were developed for the casting of various parts, research was done on new materials for use in motor-vehicle and truck construction, and a new make of steel for the production of fork lifts for power trucks etc. was introduced. The adoption of these developments in producer plants led to the realization of significant economic effect.

A number of other examples can be cited, too.

In the production-training center that is being set up at the Institute of Physical Metallurgy and Metal Technology, Bulgarian and foreign specialists will be trained and personnel employed on problems of material processing under gas counterpressure will constantly receive further training.

These successes show the capabilities of the Institute of Physical Metallurgy and Metal Technology, besides dealing with its fundamental functions, of actively participating in both the solution and practical exploitation of a number of applied problems of important significance for the national economy.

The main task, however--in the spirit of the party decisions to constantly increase the role of Bulgarian science and link it more closely with production problems--is to create conditions which will permit widening the application of methods of materials processing under gas counterpressure, as well as putting into practice the principles of intellectualization, which are organically linked with the development and application of these methods.

6474
CSO: 2202

SPECIAL ASPECTS OF THE OPERATION OF NURSING UNITS FOR TREATMENT OF MASS BURNS

Budapest HONVEDORVOS in Hungarian Vol 31 No 3-4, Jul Dec 79 pp 159-166

NOVAK, JANOS, lieutenant-colonel,medical service, candidate of medical sciences

[Abstract] Since at the present time there are only about 10 surgeons in Hungary fully qualified and engaged in treating burn trauma, it is obvious that adequate treatement of mass burns (for example after a nuclear attack) rests primarily on the nursing staff and general surgeons. Training of such staff is therefore a primary prerequisite for the establishment and proper operation of mass burn treatment centers. Special attention must be given to the training of the nursing supervisors since full specialist training of the general nursing staff is a practically unmanageable task. The Ministry of Health approved a realistic guideline for a 100-bed unit: Five physicians, five operating-room nurses, eight fully trained nurses, 20 nursing aids, eight orderlies, three rehabilitation therapists and laboratory assistants, and one administrator. Factors to be considered include medical and nursing training, mental strain on the medical and nursing staff, long average residence time of the patients in the facility, higher percentage of surgical therapy than in general medical establishments, higher percentage of patients requiring intensive care than in general medical establishments, the need for training in many specialties, higher costs of maintaining the facility, and research aimed at developing improved approaches for the therapy of large numbers of burn patients. Ultimately, the facilities to be established must be adapted to the existing factors in the above terms, and it is recommended that separate facilities be established for civilian cases and military situations (the latter may be established in the field and/or as adjuncts to existing hospitals). References 26: 14 Hungarian, 2 Russian, and 10 Western.

2542
CSO: 2502

UDC: 632-934.1:632.954::632.154

ANTIDOTES TO PLANT-PROTECTING AGENTS

Budapest MAGYAR KEMIKUSOK LAPJA in Hungarian Vol 35 No 6, 1980 pp 282-286

RAJNAI, KALMAN, Nitrokemia Industrial Works, Fuzfogyartelep

[Abstract] Undesirable side effects of plant-protecting chemicals may be reduced or eliminated by the use of appropriate antidotes. Some antidotes are used to pretreat the seeds before planting; most antidotes are used in admixture with the herbicides. Typical examples of the former type are halogenated 2-hydroxyiminoacetanilides, halogenated arylsulfonamides, halogenated arylhydantoins, N-substituted dithiocarbamates (in the form of their amino salts), and halogenated isatins or oratin oximes. Among the advantages of the antidotes used in admixture with the herbicides are convenience and the fact that overdose of herbiicdes causes lesser damage because of the simultaneously increased concentration of the antidote. Among these andidotes, the literature reports about the following compounds: oxazolidine and thiazolidine derivatives, sulfur-containing chemicals such as substituted sulfonates (2-bromo-ethyl-methane (ethane) sulfonate for example), benzenesulfonyl-o-fluoroanilide, bis-(3, 3-dichloroallyl) sulfide, dicarboxylic acid amide derivatives such as N-2-fluorophenyl-phthalic acid, substituted acetamides, and so forth. No generally accepted test methods or standards exist for the characterization of the effectiveness of an antidote. It is likely that the various antidotes exert their effect via different mechanisms. Most of the work so far has been carried out on the effect mechanism of N, N-diallyldichloracetamide (R-25 7 88). This compound has markedly increased the activity of glutathione-S-transferase at the low concentration of 0.01 ppm, and it is likely that its effect is due to the activation of enzymes. Other possible mechanisms include delaying the absorption of the herbicide or stimulating the growth of the crop plant. Figures 4; references 22: 3 German, 1 Hungarian, and 18 Western.

2542
CSO: 2502

PNEUMATICS IN THE WAKE OF ELECTRONICS

Budapest FINOMMECHANIKA MIKROTECHNIKA in Hungarian Vol 19 No 6, Jun 80 pp 190-192

SZALAY, FERENC, graduate mechanical engineer, Medicor Works, Department MF [Engineering Development] I

[Abstract] Miniaturized pneumatic elements follow the development of miniaturized electronic elements. Many of the principles governing the design and construction of electronic elements also apply to pneumatic elements. The Linear Dynamics company in the United States introduced the PNEUTRONICS pneumatic system on the market, a system which features some novel approaches in this field. Since active pneumatic elements are often electrically operated, certain pneumatic elements may be incorporated in printed circuit boards. At the present time, the PNEUTRONICS system offers the following elements: electromagnetic valves (two- and three-way), pressure microswitch (capable of being actuated by overpressure or by vacuum), pneumatic edge connector (serving as pneumatic/electronic interface on printed circuit boards), pneumatic bus (rail) (to distribute or combine the pressure from the pressure medium), and various auxiliary components (such as flexible silicone-rubber tubing, various distributors and connectors, stops, and the like). Pneumatic, and in some instances also hydraulic, analog or digital systems may be made up of the pneumatic and electronic elements involved. These systems may be used to carry out open- and closed-loop control as well as logical functions. The potential applications of pneumatics are many. They include uses in laboratories; sampling, transfer, and metering of various media, for example, in medical technology; control of part-manufacturing automata; metrology; aeronautical engineering; and astronautics. Figures 5; references 2 (Hungarian).

2542
CSO: 2502

UDC: 621.391.63:631.7.068

COST EFFECTIVENESS OF THE ADOPTION OF FIBER OPTICS TECHNOLOGY

Budapest HIRADASTECHNIKA in Hungarian Vol 31 No 7, 1980 pp 241-253

HORVATH, GABOR, MARKUS, EDIT AND SALLAI, GYULA, Dr, graduate electrical engineers, staff scientists at the Experimental Institute of the Postal Service

[Abstract] A review, based on data published in the literature and on current prices prevailing in Hungary, is presented on the cost effectiveness of the introduction of fiber optics in telecommunication systems with the aim of assisting the postal service in determining whether, and, if yes, where and to what extent fiber optics should be planned for to achieve adequate and--if possible--superior communication service performance in an economical and--if possible--cost-saving manner. The following subjects are disucssed: principles of light-optical transmission (cable types, optical terminal devices, transmitter elements, receiver elements, selection criteria) and designing of connections (selection of the use area, designing of sectors, damping). Economic calculations are presented (comparisons of various systems, starting cost data for various transmission systems, terminal costs, costs which are related to the length of the transmission path, repetition costs, methods of calculating), and evaluation of available technical and economic data. An evaluation of the data and assessments provided indicates that fiber optics can be gradually introduced in a cost-effective manner, starting within a few years with transfer and rural networks, and later also with trunk connections (using appropriate repeaters in appropriate distances). The rate of development is almost exponential and further breakthroughs and improvements may take place so that currently forecast development may become obsolete. Figures 11; references 14: 3 German, 6 Hungarian, and 5 Western.

2542
CSO: 2502

UDC: 621.313+621.316:534.322.3.08

ERRORS OF MEASUREMENT AND EVALUATION IN THE DETERMINATION OF THE AUDIO OUTPUT OF ELECTRICAL MACHINERY AND EQUIPMENT

Budapest ELEKTROTECHNIKA in Hungarian Vol 72 No 12, 1979, pp 338-344
manuscript received September 1979

TIMAR PEREGRIN, LASZLO, Dr, graduate electrical engineer, candidate of technical sciences, associate professor at the Department of Electrical Machinery, Budapest Technical University and YANG, S,J., Dr, graduate electrical engineer, lecturer at Heriot-Watt University, Edinburgh

[Abstract] Errors in the measurement of the sound output of electrical machinery and equipment arise because i) the sound source is not an ideal point source so that no spherically symmetrical audio field develops, ii) the acoustical environment is not spherically symmetrical either but is close to hemispherical owing to the rigid floor, and iii) the sound-measuring instruments cannot be placed ideally in terms of layout and number of probes. Errors due to these factors were investigated theoretically and correction factors calculated. Empirical methods for considering the causes of the errors in measurement and subsequent evaluation were discussed. Special emphasis was given to possible errors caused by the fact that most measurement data originate form the close vicinity of the sound source. Too many errors enter the measurements due to the fact that such measurements contain numerous assumptions, not all of which are justified on the basis of experimental studies. Major improvement in the accuracy of the results of the evaluations could be made by using the approach described. Figures 5; references 15: 1 German, 4 Hungarian, and 10 Western.

2542
CSO: 2502

DESIGN OF A HIGH-RESOLUTION PRECISION POSITIONER

Budapest FINOMMECHANIKA MIKROTECHNIKA in Hungarian Vol 19 No 7, Jul 80 pp 193-197

PETRIK, OLIVER, Dr, professor, Department of Optics, BME [Budapest Technical University]

[Abstract] Design criteria for precision positioners with high resolution (0.1 - 0.01 μm) over a relatively wide range (100 - 300 μm) and with a high degree of reproducibility, as required, for example, in the manufacture of integrated circuits, are discussed. Insofar as the precision movement is concerned, this can be accomplished by direct means or via a transfer unit. Direct actuators may be mechanical (manually or automatically controlled), hydraulic, pneumatic, electromagnetic, or based on thermal dilatation. The transfer units are employed to speed up the movement; this may be accomplished by means of d.c. servo motors of which the rotary movement is converted into straight-line movement. The mechanism of the transfer units must be made up of elastic elements; various parallel springs may be used to ensure this. Designs with low hysteresis properties have been described in the literature. One such design employs a rigid frame elastically supported on its four corners. It has a transfer coefficient of 16.22, a natural circular frequency of 18,849.5 rad/sec, and a damping coefficient of 19.56.10^{-1}. This design features satisfactory dynamic performance and simple construction. Measurements to assess the dynamic performance are described; they use the dynamic method involving the measurement of the free oscillations after pulse-triggered start by means of a piezoelectric accelerometer and display of the signals obtained on an oscilloscope screen. The apparatus featuring this design works well even with movements having a dynamics of only a few Hz. Figures 7; references 3: 1 Western, 1 Hungarian, and 1 Russian.

2542
CSO: 2502

POLISH ACADEMY OF SCIENCES ACTIVITIES, PERSONNEL

Warsaw NAUKA POLSKA in Polish No 5, May 80 pp 103-108

[Excerpts] Educating for Peace

The Main Administration of the Polish Teachers' Union, under the auspices of the World Federation of Scientific Workers, organized an international seminar in Warsaw from 21 to 22 March 1980 on the subject: "Teachers and scientific workers in relation to the problem of educating societies in the spirit of peace." Representatives of the various disciplines of knowledge took part in the seminar, including pedagogy, sociology, history, philosophy and political science, as well as college teachers, scientific workers, representatives of social organization and also representatives from Czechoslovakia, the GDR and the Soviet Union.

The sessions were opened by Boleslaw Grzes, president of the Polish Teachers' Union, who emphasized the fact that educating in the spirit of peace is the moral obligation of teachers and scientific workers. Then the opening paper of the sessions entitled "The Development of Ideas of Educating for Peace on the International Forum" was presented by Professor Janusz Gilas of Nicholas Copernicus University [UMK] in Torun, and the secretary of the Central Committee [CK] of the Union of Workers of Education, Higher Learning and Science of the USSR Maria Kozlova presented a paper entitled "The Problem of Detente and Peaceful Coexistence and the Idea of Educating for Peace." A study done by the Japanese Association of Scientists treating questions of the development of international cooperation in the light of the problem of educating for peace was also presented.

During the discussion, the complexity of the problems of educating societies in the spirit of peace in the contemporary world, which is full of numerous conflicts of interest and tendencies, was pointed out. Attention was called to the need for governments to conclude suitable conventions and to undertake the appropriate resolutions to make the education of societies in the spirit of peace of legal responsibility.

The seminar occasioned the discussion of many phenomena of an international nature. The composite elements of the concepts of educating societies in the spirit of peace and educating for disarmament were pinpointed. For the

first time, certain tasks in the area of educating for disarmament were laid out in accordance with the UN declaration of 1978 and the activity undertaken in this spirit by UNESCO, which will organize a special congress devoted to this question in 1980.

At the end of the seminar a resolution was declared in which participants made an appeal to all teachers and scientific workers for the broad dissemination of ideas of educating in the spirit of peace, for the undertaking of endeavors toward educating for disarmament. An urgent need was determined to work out an international program of action in this area, and to develop the UN declaration of educating for peace in the form of international agreements and binding legal documents in particular countries of the world.

On the Question of Environmental Protection

From 11-12 January 1980 in Konin a conference of the Committee of the Development of Midwestern Macroregion was held on the topic of environmental protection and the development of the environment in the midwestern macroregion.

Participants in the conference included: regular member of the [PAN] Polish Academy of Sciences Wlodzimierz Michajlow, Professor Zdzislaw Fedorowicz in place of the head of the Planning Commission of the Council of Ministers, first secretary of the PZPR Voivodship Committee in Konin Andrzej Borkowski, Konin Governor Henryk Kazimierczak and deputy governors from Bydgoszcz, Kalisz, Konin, Pila, Poznan, Torun and Wloclawek, i.e., the voivodships which make up the midwestern macroregion.

Scientific-technical Progress and the Development of Industry

On the initiative of the departments of Heavy Industry, Transport and Construction, and of Science and Education of the PZPR Central Committee, the Higher School of Social Sciences of the PZPR Central Committee, the Institute of Planning of the Planning Commission of the Council of Ministers, the Institute of Basic Problems of Marxism-Leninism of the PZPR Central Committee and the Chief Technical Organization organized an all-Poland conference on the topic: 'Scientific-technical progress as a basic factor in the development of industry.' The conference took place in Warsaw from 3 to 4 January 1980 and was attended by over 300 persons--scientific workers from the Polish Academy of Sciences, from institutions of higher learning and research-developmental facilities of industry, party and economic aktivs, representatives of economic organizations and the technical community.

The goal of the conference, which was opened by Professor Wladyslaw Zastawny, rector of the Higher School of Social Sciences, was the presentation and discussion of problems relating to: scientific-technical progress in the development of the economy, factors and directions of development of science and technology, and the mechanisms of directing research efforts, developmental tasks and training in industry. In general, 23 papers were presented during plenary sessions and in problem sections. Among those who participated were the following: alternate member of the Political Bureau of the PZPR Central

Committee, the head of the Planning Commission of the Council of Ministers, Deputy Minister Tadeusz Blaszczyk, spoke on socioeconomic development and scientific-technical progress in the 1980's· Minister of Science, Higher Education and Technology Janusz Gorski and the scientific secretary of the Polish Academy of Sciences and regular member of PAN, Jan Kaczmarek, together presented the real problems of the central direction of scientific activity in the light of the resolution of the 12th Plenum of the PZPR Central Committee and the significance of basic research for technical progress· the chairman of the Chief Technical Organization [NOT], Minister of the Machine Industry Aleksander Kopec, devoted his paper to a discussion of the role of the community of engineers and technicians in the socio-economic development of the country; director of the Institute of Basic Problems of Marxism-Leninism Andrzej Werblan presented the social aspects of scientific-technical progress. Among the topics discussed in problem sections were: the organization of the processes of scientific-technical progress, initiating and planning the development of science and technology, and the conditions and tools of the implementation of plans of scientific-technical progress. Participants shared the practical experiences of particular subbranches of industry, such as the shipbuilding and aviation industries, which are most eager to take advantage of the achievements of science, in the introduction of scientific-technical progress.

Among the subjects treated in disucssion were the Slack Polytechnic's achievements in the cooperation of science and economy of the region. Representatives of the technical sciences of PAN presented their achievements in the area of completing important professional reports, ranging from those relating to the directions and methods of improving machine design to those concerning the perspectives of the development of the technology of fiber-optics, which is of importance to communications and information science, and to the perspectives of the development of scientific equipment. The role of electrical energy in meeting the growing need for it in industry was noted; the need for strengthening vocational ethics and the sense of responsibility of persons participating in the process of putting necessary innovations into practice was emphasized· and attention was called to the need for disseminating knowledge in the field of modern management organization among the technical community and among the directorial cadre.

Among other things, it was ascertained that social and economic goals for the 1980's can only be achieved by increasing management efficiency, the basis of which is technical and organizational progress.

Director of the Department of Science and Education of the PZPR Central Committee Jarema Maciszewski summarized the sessions.

Forecating the Development of Information Science

The 15th Conference of the Diebold European Research Program [EPB] convened in Krakow from 14 to 15 January 1980. The author of this program 25 years ago was John Diebold in the United States; the program has been implemented

in similar centers in Europe since 1964. Participants in the European Diebold program are informed immediately about the production of new computer hardware, about its software and about its utilization in management. Twice yearly conferences are organized. The last one was held in Brussels in March 1979. In addition to this, during the course of the year all those who are interested receive reports compiled by this international organization.

Socialist countries participating in the Diebold program besides Poland are Hungary and the GDR. Poland has over 1,000 users, who systematically receive a packet of the newest information about developments in this sector.

The Association of Information Science, which has 16 enterprises and employs 86 computers of varying capacities, plays a major role in the workings of this program.

During the conference many issues were taken up, including a discussion of the kinds of action to be taken to reduce the disproportion between the growing efficiency of computer hardware and the insufficient productivity of programmers and designers (which is a worldwide phenomenon). The creation of information systems, which now takes several years, must be considerably shortened. Problems relating to the construction of new computer hardware in conjunction with the introduction of the gradual decentralization of processing were discussed. With more and more minicomputers in operation in offices and institutions, the role of large computer centers is questioned.

The organizers of the Krakow conference were: The Association of Information Science, the Center of Designing and Application of Information Science and the Electronic Computer Computation Office in Krakow. Head of the Diebold FRG Dr Wolfgang Hassbender was one of the lecturers.

The Production and Processing of Fiberglass

A symposium of the Composites Section and the Ceramics Section of the Scientific Committee on Materials of the PAN, devoted to the role of production and processing of fiberglass, was held at the Krosno Glassworks on 15 January 1980. Besides representatives of this fiberglass production center, approximately 20 well-known experts from university centers, institutes and scientific institutions throughout the country participated in the symposium.

The program of the conference consisted of the following papers: "The Application of Fiberglass in Composites" by Assistant Professor of Engineering Wacław Królikowski (Szczecin Polytechnic); "Kaolin Fibers" by Professor Stanisław Pawłowski (Silesian Polytechnic); "Carbon Fibers for Composites" by Professor Roman Pampuszek (Academy of Mining and Metallurgy); "Alkali-resistant Fibers" by Professor Wacław Tuszyński (Institute of Civil Engineering in Warsaw).

During the discussion views were expressed on the subject of the possibilities of the application of fibers in practice. There was a discussion about a program for the development of the production of fiberglass at the

Krosno Glassworks and about the processing of fiberglass from the viewpoint of its application to the needs of the coal industry, electronics, electrotechnics and construction materials.

Symposium--RENIOM 80

The Institute of Physics and the Chemistry of Metals of Slask University in Katowice organized the Third All-Poland Symposium from 29 to 31 January 1980 in Katowice on the topic "Inelastic Relaxation and Magnetic Delay in Solid States"--RENIOM 80.

Participants in the symposium were physicists, physical metallurgists and scientific workers in other specialties from all national academic centers and institutes of PAN, as well as from several scientific-research laboratories in industry involved in the application of internal friction and the disaccommodation of magnetic permeability in the physics of metals. Representatives from the appropriate foreign centers in France, Rumania, Hungary and Czechoslovakia were likewise present.

Questions of Potato Production

A scientific-technical conference of The Association of Engineers and Technicians in Agriculture [SITR] was held in Sycewice on 15 January 1980. It was devoted to the organizational and economic problems of potato production, with particular attention being given to the conditions of its cultivation in the Slupsk Voivodship. The conference was organized through the efforts of the Voivodship Branch of SITR.

Papers treating the subject of the conference were presented by: the director of the Potato Institute in Bonin, Assistant Professor Edward Kapsa; Professor Kazimierz Piechowiak of the Agricultural Academy in Poznan; Dr Waldyslaw Stachurski of the Potato Institute in Bonin, and the head of the Voivodship Branch of SITR in Slupsk, Stanislaw Czupajlo, M.A. in Engineering.

Issues of Food and Nourishment

Under the direction of the president of PAN, regular member of PAN Witold Nowacki, a conference was held in Warsaw on 18 January 1980 on the subject "Polish Science for Food and Nourishment." Participants in the conference were: the secretary of the PZPR Central Committee Jozef Pinkowski, chairman of the Central Union of Agricultural Cooperatives [CZSR], discussing "Peasant Self-help," minister Jan Kaminski and scientific workers representing various scientific disciplines.

The purpose of the conference was to attempt to define the possibilities for hastening the development of the nourishment complex through the improved utilization of existing scientific potential. The role to be played in this area by agricultural and forestry scientists was noted, and the degree to which other areas of science should be included was suggested.

The Agricultural Development of the Rudawa

The Association of Engineers and Technician in Agriculture, the Agricultural Academy in Krakow, the Zootechnical Institute and the PAN Branch in Krakow organized a scientific-technical conference in Krakow on 18 January 1980 with the theme of the agricultural development of the Rudawa and water purity in this river.

The purpose of the conference was to draw attention to the multitude of existing problems connected with the rationalization of water management, the influx of agricultural chemicals into surface waters, and the consequences of the development of the Krakow urban-industrial center, all of which lower the water quality in the Rudawa. Among other topics, papers treated the state of and need for land reclamation in the Rudawa River basin, the influence of chemical means of plant preservation on the contamination of waters and the potential of the Rudawa as a water source for Krakow.

Polish-Soviet Cooperation in Agriculture

The Main Administration of the Society for Polish-Soviet Friendship [TPPR] in conjunction with Section 5 of PAN--Agricultural and Forestry Sciences, the minister of agriculture, the Institute of Truck Farming and the CZSR "Peasant Self-help' organized a conference in Skierniewice on 28 January 1980 with the theme of Polish-Soviet cooperation in the field of agriculture. Approximately 150 representatives of agricultural institutes, higher schools and farm workers participated in the sessions. The purpose of the conference was to survey the more important real topics and problems of agriculture which must be made known to the people in general.

The program of the conference consisted of eight papers, which were delivered by such specialists as: the secretary of Section 5 of PAN, corresponding member of PAN Zbigniew Gertych, director of the Truck Farming Institute in Skierniewice; vice president of PAN, regular member, of PAN Szczepan Pieniazek; advisor to the USSR Embassy in Warsaw, Dr Ignatiy Kuzhnetsov; Director of the Institute of Agrarian Policy Professor Boleslaw Struzek.

The basic problem of the development of concentration and specialization in agricultural production and the conditions for and development of forms of intereconomic coproduction and agricultural-industrial integration in the USSR were the topics under discussion. In the discussion of a program of cooperation of CEMA countries in the field of agriculture to 1990, Polish-Soviet cooperation in the area of the development of agricultural sciences and the effect of such cooperation on the development of agricultural practice in Poland were emphasized, as well as cooperation in the form of cadres of specialists in agriculture.

Participants in the conference visited the Skierniewice scientific institutes: the Institute of Truck Farming and the Institute of Pomiculture and Floriculture.

Plant Protection

The Institute of Plant Protection in Poznan organized an international scientific session on the subject of plant protection. It was held on 7 February 1980 in Poznan, and participants represented the national scientific community and the scholarly community from Belgium, Czechoslovakia, Japan, the GDR and the USSR.

Topics discussed were the application of chemical and biological means in plant protection, toxicology and the side effects of pesticides, as well as the so-called integrated methods used in agricultural practice.

Water and Food

From 11 to 14 February 1980 in Szczecin, the 11th Symposium of the PAN Committee of Food Technology and Chemistry and the Agricultural Academy in Szczecin was held to discuss problems connected with the role of water in food production.

During the conference papers were delivered by the following: Professor Adolf Herubala--"Water As an Element of Food;" Professor Edward Kolakowski--"Water As the Environment of Food Production;" Assistant Professor Tomasz Wolski--"The Rational Management of Water in the Food Industry." Discussions were also held in problem sections. Much attention was paid to questions connected with the preparation of cadres for the food industry in higher schools.

The Management of Water Resources

The Institute of Meteorology and the Marine Economy [IMGW] with the assistance of the Italian firm TECNECO organized a Polish-Italian scientific symposium from 24 to 26 March 1980 in Warsaw on the subject of the management of water resources. The Italian firm TECNECO is involved in water engineering, among other things, and questions of the marine and agricultural economy.

Participants in the symposium--besides scientific workers and Polish specialists representing, for example, IMGW, the Office of the Government Plenipotentiary for Affairs of Wisla Management and institutions of higher learning--were Italian specialist from research institutes and Padua and Bari.

The achievements of both countries in the field of the rational management of water resources in regional systems and in the protection of their quality, as well as the economic aspects of water protection were presented in several dozen papers.

Cybernetics in Medicine

From 28-30 January 1980, the 4th National Scientific Conference devoted to biocybernetics and biomedical engineering--an important field of contemporary biology and medicine--was held in Poznan. The meetings were organized by

groups with an interest in these problems, i.e., committees of the PAN, scientific societies, the Poznan Academy of Medicine and the Chief Technical Organization [NOT]. The conference included the participation of 420 specialists from Poland and from Bulgaria, Czechoslovakia, Yugoslavia and the Soviet Union.

Approximately 200 papers were delivered treating such questions as: the utilization of experiments in cybernetics and information science in medical studies to diagnose illnesses and to replace certain internal organs with their artificial counterparts; the possibilities for controlling the physiological processes of man; the possibilities for constructing robots and automated models, for example, to be used in rehabilitation and in helping to effect an improvement in the working conditions of man.

Thirty Years of the Institute of Thermal Engineering

In December 1979 The Institute of Thermal Engineering [ITC] in Lodz celebrated 30 years of its work. On this occasion a scientific conference was held on 19 December 1979, in which representatives of the government and the party, scientific workers, representatives of the MEGAT Association and of institutions and centers working in conjunction with ITC participated.

An occasional paper was delivered by the director of this center, Professor Wlodzimierz Wisniewski. He remarked on the early work of the institute, which dates from 1949. The first important achievement was the development of an experimental gas turbine. From the beginning of its existence this important scientific center of the power industry has worked closely with industry, which has fostered the development of scientific-research efforts as well as specialization, e.g., in the construction of boilers and turbines, auxiliary equipment and automatic control for power needs.

Presently the ITC employs a cadre of 127 scientific-research workers and 177 engineering-technical workers. They have been engaged in developing new arrangements for the conventional power industry, and for several years for the nuclear power industry. Devices produced at the institute serve not only our production enterprises, but are also exported to the USSR, Yugoslavia, Turkey, China, Bulgaria, Czechoslovakia and the GDR.

In conjunction with the development of the power industry in Poland, in the near future the ITC will engage in working out new design and technological devices and machinery for electric power plants and nuclear electric power and heat-generating plants, both for domestic needs and within the framework of INTERATOMENERGO, auxiliary equipment for the Electric Power Plant in Belchatov, heat-generating boilers, industrial and power boilers with fluidized-bed furnaces.

Outstanding scientific workers and practicianers received high state honors on the occasion of the jubilee.

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